

AMENDMENTS TO THE CLAIM

Claim 1. (Currently Amended)

A voice recognition device for a car navigation system, comprising:

a sound analyzer that ~~analysis means for~~ acoustically analyzes ~~analyzing~~ a user's vocal utterance inputted by a voice input means and for outputting a feature vector for the input sound;

an acoustic-model storage that stores ~~means for storing~~ in advance respective acoustic models for predetermined sound units, either a syllable or a phoneme being deemed a sound unit;

a sound-unit recognizer ~~recognition means for checking~~ that checks the input-sound feature vector against the acoustic models to output a correlated sound-unit recognition candidate string;

a word-and-position-information registration unit ~~means for correlating~~ that correlates and registers ~~registering~~ in a word-and-position-information correlation dictionary the sound-unit recognition candidate string and position information acquired from a main unit of the car navigation system; and

a position-information searcher/outputter that calculates ~~searching/outputting means for calculating~~ acoustic likelihoods by collating the input-sound feature vector outputted by the sound analyzer ~~analysis~~ ~~means~~, against sound feature vectors for the sound-unit recognition candidate strings in the word-and-position-information correlation dictionary, and outputting, to the car navigation main unit, position information associated

with that sound-unit recognition candidate string whose calculated acoustic likelihood is not less than a predetermined threshold.

Claim 2. (Currently Amended)

A voice recognition registration device for a car navigation system according to claim 1, further comprising:

a confused-sound-unit matrix storage that stores ~~storing means for storing~~ in advance respective probabilities that an actual sound unit uttered by a human being will be recognized as a different recognition result as a consequence of the recognition precision of the sound analysis means, for each of recognition-result sound units; and

a word developer that outputs ~~developing means for outputting~~ a candidate resembling the sound-unit recognition candidate string by replacing each sound unit in the sound-unit recognition candidate string outputted by the sound-unit recognition ~~means~~, with a recognition-result sound unit in which the probability that the confused-sound-unit matrix storage ~~storing means~~ has stored for that sound unit is not less than a predetermined threshold;

wherein the word-and-position-information registration ~~means~~ correlates the resembling candidate to the position information acquired from the car navigation system main unit and registers this information in the word-and-position-information correlation dictionary.

Claim 3. (Currently Amended)

A voice recognition index-searching device comprising:

a similar-word indexer that stores ~~indexing means for storing~~ relationships between a representative word, selected from each of word groups generated in advance by categorizing a plurality of words into groups in which words resemble in pronunciation, and its group; and

a searching device that searches ~~means for searching~~ for similar words within a group, said searching device that collates ~~means collating~~ a sound feature vector for the representative word for each group stored in the similar-word indexer ~~indexing means~~ against a given sound feature vector to calculate respective acoustic likelihoods, and collating a sound feature vector for each word in that group whose representative word has an acoustic likelihood, among the calculated results, not less than a predetermined threshold, against the given sound feature vector to calculate respective acoustic likelihoods, and outputting the word having the greatest acoustic likelihood.

Claim 4. (Currently Amended)

A voice recognition index generator ~~generation means~~ comprising:

a representative word selector that selects ~~selection means for selecting~~ a single word as a representative word from an original set composed of a plurality of words;

an acoustically similar word grouper that extracts ~~grouping means for extracting~~ from the original set, a word in which the acoustic likelihood

between a sound feature vector for the word and a sound feature vector for the representative word is not less than a predetermined threshold, and including the extracted word in a same group as the representative word; and

an original-set replacer that passes ~~replacing means for passing~~ to the representative word selector ~~selection means~~ the word set left by removing from the original set the word affiliated by the group, as another original set to be processed by the representative word selector ~~selection means~~.

Claim 5. (Currently Amended)

A voice recognition device for a car navigation system according to claim 1, wherein the position-information searcher/outputter ~~searching/outputting means~~ includes a voice recognition index-searching device ~~according to claim 3 or claim 5~~, and uses the voice recognition index-searching device to search for and output words, their pronunciations, and position information stored in the word-and-position-information correlation dictionary or an external storage device.

Claim 6. (Currently Amended)

A voice recognition device for a car navigation system according to claim 5,

wherein ~~a~~ the word developer ~~developing means~~ extracts a probability stored in ~~a~~ the confused-sound-unit matrix storage ~~storing means~~ for each

sound unit of the resembling candidate, and outputs a probability list for the resembling candidate;

wherein the word-and-position-information registration unit ~~means~~ correlates and registers in the word-and-position-information correlation dictionary both the probability list and the similar candidate with the position information; and

wherein the position-information searcher/outputter ~~searching/~~
~~outputting means~~, after reading a resembling word candidate stored in the word-and-position-information correlation dictionary and the probability list for that resembling word, and if the probability in its probability list is not less than a predetermined threshold, calculates the acoustic likelihood by checking the input-sound feature vector against the sound feature vector outputted by a
~~the~~ sound feature vector generator ~~generation means~~ and outputs the sound-unit recognition candidate string whose acoustic likelihood is not less than the predetermined threshold, and if the probability in the probability list is less than the predetermined threshold, the position-information searcher/outputter
~~searching/outputting means~~ uses the voice recognition index-searching device ~~according to claim 3~~ to search for words, their pronunciations, and position information stored in the external storage device.

Claim 7. (Currently Amended)

A car navigation system comprising:

a current position detector ~~detection means~~;

a map data storage ~~means~~;

an image display ~~means~~;

a graphical pointer ~~pointing~~ means;

a destination input device ~~means~~; and

a voice recognition device including: ~~according to any one of claims 1, 2, 5, or 6.~~

a sound analyzer that acoustically analyzes a user's vocal utterance inputted by a voice input means and for outputting a feature vector for the input sound;

an acoustic-model storage that stores in advance respective acoustic models for predetermined sound units, either a syllable or a phoneme being deemed a sound unit;

a sound-unit recognizer that checks the input-sound feature vector against the acoustic models to output a correlated sound-unit recognition candidate string;

a word-and-position-information registration unit that correlates and registers in a word-and-position-information correlation dictionary the sound-unit recognition candidate string and position information acquired from a main unit of the car navigation system; and

a position-information searcher/outputter that calculates acoustic likelihoods by collating the input-sound feature vector outputted by the sound analyzer, against sound feature vectors for the sound-unit recognition candidate strings in the word-and-position-information correlation dictionary,

and outputting, to the car navigation main unit, position information associated with that sound-unit recognition candidate string whose calculated acoustic likelihood is not less than a predetermined threshold.